PEACE/WILLISTON
FISH & WILDLIFE
COMPENSATION
PROGRAM

BC hydro

BRITISH
COLUMBIA

A Reconnaissance Survey Of Le Moray Lake (#1)

A. R. McLean
1991

PWFWCP Report No. 107

The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

Peace/Williston Fish and Wildlife Compensation Program, 1011 Fourth Ave. 3rd Floor, Prince George B.C. V2L 3H9

Website: *www.bchydro.bc.ca/environment/initiatives/pwcp/*

This report has been approved by the Peace/Williston Fish and Wildlife Compensation Program Fish Technical Committee.

Citation: A. R. McLean. 1991. A reconnaissance survey of Le Moray Lake (#1). Peace/Williston Fish and Wildlife Compensation Program, Report No. 107. 22pp plus appendices.

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A RECONNAISSANCE SURVEY OF

LE MORAY LAKE (#1)

WATERSHED: Pine River

DATE OF SURVEY: September 8, 9, 10, 1991

FIELD CREW LEADER: A.R. McLean

FIELD ASSISTANT: A.R. Langston

WILLISTON FISHERIES PROJECT

B. C. HYDRO

ENVIRONMENTAL RESOURCES

and

B.C. ENVIRONMENT

RECREATIONAL FISHERIES BRANCH

REPORT PREPARED BY: A.R. McLean

REPORT EDITED BY: A.R. Langston

RELEASED BY: _____

Ted Down, Regional Fisheries Biologist

105-02829/

LAKE: **Le Moray #1**

SYSTEM NAME: Unnamed C.

A.S.A.P. REFERENCE NO.:

SYSTEM NO: 234-8120-250

DATA ON FILE FOR THIS SURVEY

Location	X	Dissolved O2/Temp. Profiles	X
Physical Data	X	Winter Dissolved 02/Temp. Profiles	X
Bench Mark	X	Netting Record	X
Terrain Features	X	Lake Catch Summary	X
Access	X	Individual Fish Data	--
Resorts and Campsites	X	Fish Preserved	--
Other Developments	X	Stomach Analysis	--
Obstructions and Pollutions	X	Scale Reading	--
Special Restrictions	X	Location of Inventory Sites	X
Aquatic Plants	X	Photograph Directory	X
Wildlife Observations	X	Appendices:	
Miscellaneous Comments	X	A: Water Chemistry Analysis	X
Lake Drainage	X	B: Tributary Stream Data	X
Fisheries Management Comments	X	Bathymetric Map Reduction	X
History of Previous Surveys	X	Bathymetric Map	X
Water Chemistry Summary	X		

LOCATION

Location:	62 km southwest of Chetwynd		
Elevation:	1386 m +/-		
Latitude/Longitude:	55°27'55":122°30'05"	U.T.M.:	10.5318.61465
Management Unit:	7-22	N.T.S. Map No.:	93-08

Drainage: Outlet C. --> Mountain C. --> Pine R. --> Peace R.

PHYSICAL DATA

Lake Drainage Area:	--	km^2	Volume:	1 461 000	m^3
Water Surface Area:	181000	m^2	Flushing Rate:	--	
Area above 6 m contour:	65400	m^2	Perimeter of Islands:		
Shoreline Perimeter:	2500	m	Number of Islands:	0	
Maximum Depth:	20.8	m	Mean Depth:	8.1	m
Filterable Residue (TDS):	56	mg/l	Secchi Reading:	6.4	m

Sounding Device: Lowrance X-15 Elevation Source: Contour interpolation

BENCHMARK

(Iron spike, center of red circle) located at the south end of the lake, in a 25 cm white spruce tree, 3.0 m from shore. Bench mark is set 2.0 m above the current water level.

High water mark: lake appears to be at maximum pondage.

ROCKY
MOUNTAIN
FOOTHILLS
Moberly Lake
LeMoray L (I)
Scale 1:332 000

Lake: **LE MORAY #1**

TERRAIN FEATURES

Immediate Shoreline:

Le Moray Lake #1 is treed to shoreline, (80% alpine fir, 20% white spruce) with the exception of sporadic clearings of dense bog willow. Bog willow extends approx. 1.5 m into the lake at the northeast and southeast shores. The east shoreline is characterized by a boulder substrate which drops off sharply. The west shore is dominated by a gravel/silt substrate with a sporadic cobble/boulder presence, and the lake bottom dropping off moderately. The south end and the two bays at the north end of the lake exhibit very low gradients and substrate consisting of glacial silt and low amounts of small gravel. Boating access to and from shore is fair, with the exception of the steeply sloped rock bluffs present along the majority of the east shore.

Surrounding Country:

Le Moray Lake #1 is nestled in the rugged Rocky Mountains. Steep mountainous terrain, with numerous exposed patches of boulder and shale surround the lake. Also present are alpine meadows (populated with fireweed, shrubs, and wild flowers) and a sparse forest cover consisting of alpine fir and white spruce. A dense tangled undergrowth of bog willow is predominant on the forest floor and in the alpine meadows.

Le Moray Lake #1 is located in the Englemann spruce - subalpine fir biogeoclimatic zone.

Lake: **LE MORAY #1**

ACCESS

Directions:

Le Moray Lake #1 is approximately a 15 minute helicopter flight from Silver Sands Lodge, which is located 31 km north of Azouzetta Lake on Highway 97.
No ground access to the lake was observed.

Road Type and Conditions:

None.

Restrictions:

None noted.

RESORTS AND CAMPSITES

None, however a recreation site would be best suited to the low sloping north end. Discussions are in progress with the Forest Service (Dawson Creek) with regards to trail access and recreation site development, should this lake be stocked.

OTHER DEVELOPMENTS

None.

Lake: **LE MORAY #1**

OBSTRUCTIONS AND POLLUTIONS

Falls are present 700 m downstream of the lake. These falls are a definite upstream barrier to fish passage (see photograph). Numerous other falls and cascades are present on the outlet and Mountain C. (as derived from NTS map No. 93-0/7 (edition 3), some of which may be barriers to upstream fish passage.

SPECIAL RESTRICTIONS

None noted.

AQUATIC PLANTS

Very small amounts of sedgegrass were noted in some small bays.

WILDLIFE OBSERVATIONS

2 unidentified species of waterfowl
moose tracks and droppings.

MISCELLANEOUS COMMENTS

Highly abundant concentrations of Zooplankton noted in the first metre of water.
Bathymetric map: The lake outline is from an enlargement of aerial photograph B.C. 7188 No. 59, flown June 1969.

Lake: **LE MORAY #1**

LAKE DRAINAGE

General:

Le Moray Lake #1 has two inlets and one outlet. The outlet flows 3.5 km southwest to Mountain Creek. Mountain Creek flows north 8.5 km to its confluence with the Pine River.

Major Systems:

None.

Minor Systems:

Unnamed C. - inlet #1

The first 230 m of this meandering inlet were investigated. Draining into the north end of the lake, this inlet had an average wetted width of 1.5 m, average depth of 20 cm, water temperature of 4.5°C and a field gradient of 1.5%, approximately 220 m upstream of the lake. This inlet has small amounts of usable spawning substrate, fair juvenile rearing habitat and no overwintering habitat.

See point sample card for additional information.

Unnamed C. - inlet #2

Inlet #2 drains from Le Moray Lake #2 into Le Moray Lake #1 on the east shore. This inlet had an average wetted width of 1.5 m, average depth of 20 cm and a length of 28 m. Inlet #2, overgrown with bog willow, affords no salmonid spawning or rearing habitat.

Unnamed C. - outlet

The initial 200 m of the outlet was investigated. The first 30 m had a wetted width of 3.5 m and little flow (affected by lake level). This section has moderate spawning and rearing potential. Approximately 200 m downstream of the lake the outlet had a wetted width of 2.7 m, average depth of 15 cm and a field gradient of 5%. Minimal spawning (large substrate size) and rearing (steep gradient) habitat was noted. No overwintering habitat was observed.

See point sample card for additional information.

Lake: **LE MORAY #1**

FISHERIES MANAGEMENT COMMENTS

Two overnight netsets and two minnow traps fishing for 13 hours yielded no fish. The lake is therefore believed to be barren of all fish species. Falls, which are barriers to upstream fish passage, are present approximately 700 m downstream of the lake. Numerous other cascades/falls are present on the outlet (as derived from NTS Map. No. 93-0/7 (edition 3)), some of which may be barriers to upstream fish passage. Inlet #1 has very little usable spawning habitat, but fair juvenile rearing habitat. The outlet offers moderate spawning and rearing habitat in only the initial 30 m. This low gradient portion of the outlet is affected by the lake level. An inlet stream (15 m in length) with no salmonid habitat connects Le Moray Lake #2 to Le Moray Lake #1. High concentrations of Zooplankton and some Gammarus were noted in the lake. Oxygen samples taken during the winter of 1990/91 indicate sufficient levels to support a fish population.

This subalpine lake is suitable for a sportfish introduction. The outlet stream is not believed to be a barrier to downstream fish migration, therefore, potential impacts on native fish species in the Pine River drainage, should be considered, if this lake is stocked. No ground access to the lake was observed. Should access be created, gravel placement in key areas of the inlets and outlet could significantly increase natural recruitment. Inventories should be carried out on Le Moray Lakes #2 and #3. These lakes, in very close proximity to Le Moray Lake #1, may provide more diverse salmonid habitat and may also offer unique angling potentials.

HISTORY OF PREVIOUS SURVEYS

Lake Surveys:

A winter oxygen/temperature series was collected on March 14, 1991 by T. Euchner and R. Tancock, Fish and Wildlife Branch, BC Environment, Ft. St. John.

Other Related Surveys:

None known.

Lake: **LE MORAY #1**

WATER CHEMISTRY SUMMARY **Limnology Station No. 1**

Field Conditions:

Date:	September 10, 1991			
Time:	1038	hrs	Air Temperature:	7.5 °C
Wind Velocity:	10	km/hr	Wind Direction:	south
Cloud Cover:	6/10	o.c.	Surface Condition:	light ripple
Secchi Disc:	6.4	m	Water Colour:	emerald green

Method(s) Used:

Dissolved Oxygen:	YSI model 58 oxygen/temperature meter
Water Temperature:	YSI model 58 oxygen/temperature meter
Air Temperature:	Hand-held alcohol thermometer
pH (field):	Hach pH field test kit
H2S (field):	Hach H2S field test kit
Laboratory Used:	Zenon Environmental Inc. B.C. Laboratory Services
Water Sampler:	Verticle Alpha Water Bottle (Vandorn)
Substrate Sampler:	Substrate sample not taken

Water Sample Chemistry: SEAM Site No.: not determined

	Sampling Depths			
	Surface (O m)		Lower (19.0 m)	
pH (field)	7.3		7.6	
pH (lab)	7.8		7.4	
Specific Conductance (lab)	73	umhos/cm	77	umhos/cm
Filterable Residue 105°C (lab)	56	mg/l	58	mg/l
H2S (field)	--	mg/l	O	mg/l

Bottom Depth:	20	m
Substrate Sample Depth:	--	m

Lake: **LE MORAY #1**

DATE: September 10, 1991

SUMMER OXYGEN/TEMPERATURE DATA

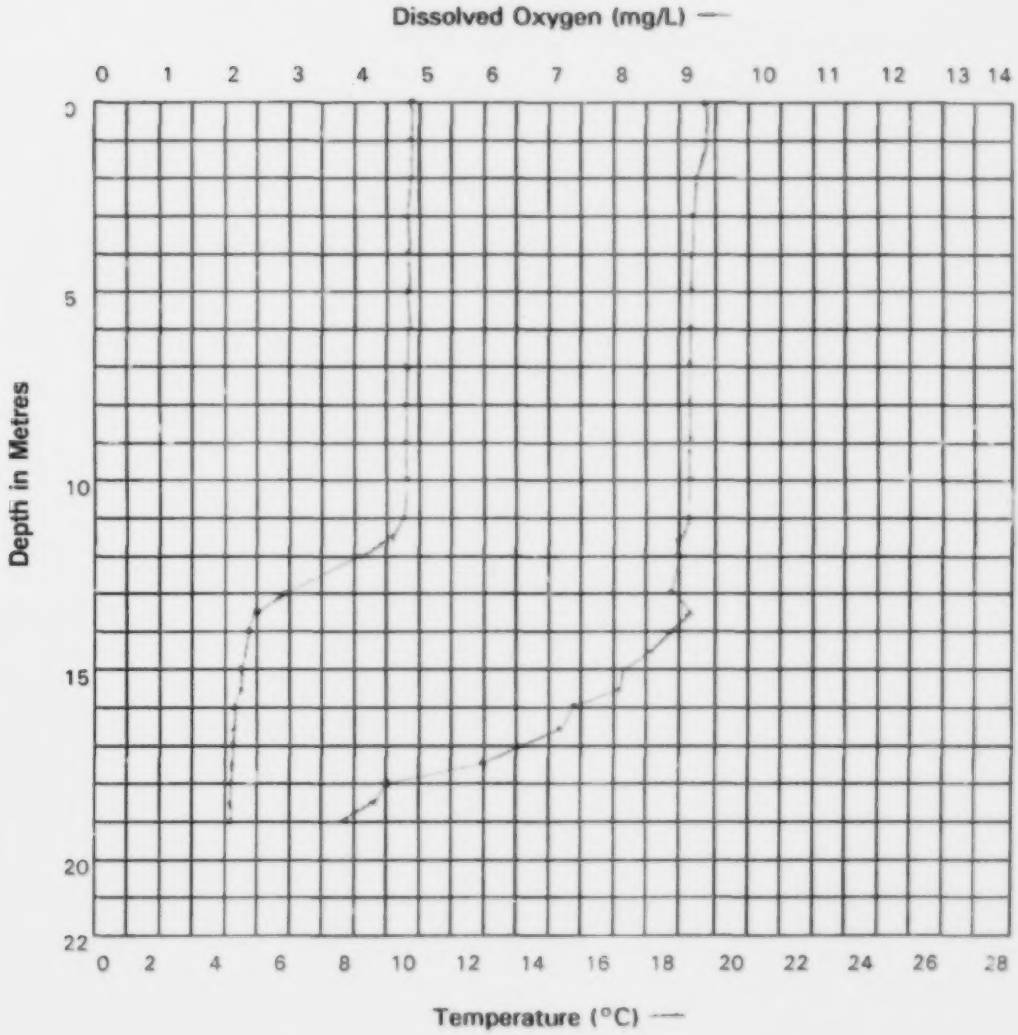
DEPTH (m)	O_2 (mg/l)	TEMP (°C)
Surface	9.3	9.7
1.0	9.3	9.7
2.0	9.2	9.7
3.0	9.2	9.6
4.0	9.2	9.6
5.0	9.2	9.6
6.0	9.2	9.6
7.0	9.2	9.6
8.0	9.2	9.6
9.0	9.2	9.6
10.0	9.2	9.6
11.0	9.2	9.5
11.5	9.0	9.1
12.0	9.0	8.1

DEPTH (m)	O_2 (mg/l)	TEMP (°C)
13.0	8.9	5.9
13.5	9.2	5.0
14.0	8.9	4.7
14.5	8.6	4.5
15.0	8.2	4.4
15.5	8.1	4.4
16.0	7.4	4.3
16.5	7.2	4.3
17.0	6.5	4.2
17.5	6.0	4.2
18.0	4.5	4.1
18.5	4.3	4.1
19.0	3.8	4.1
20.0	Bottom	

Lake: **LE MORAY #1**

SUMMER

DISSOLVED OXYGEN AND TEMPERATURE SERIES



Lake: **LE MORAY #1**

DATE: March 14, 1991
Time: 1015 hrs
Air temp.: -10 °C

CREW: T. Euchner, R. Tancock
Snow depth: 30 cm
Ice Depth: 150-170 cm
(with overflow)

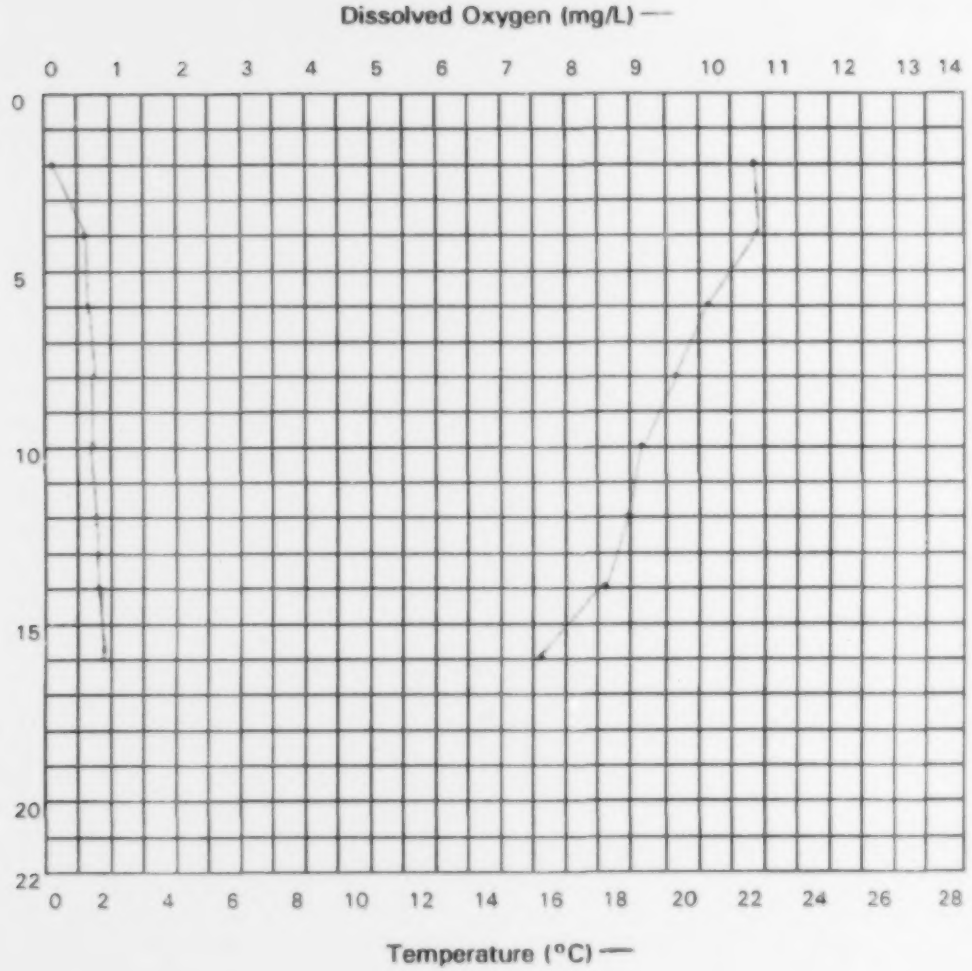
WINTER OXYGEN/TEMPERATURE DATA

DEPTH (m)	O_2 (mg/l)	TEMP (°C)
0	--	--
2.0	10.8	0.2
4.0	10.9	1.1
6.0	10.2	1.3
8.0	9.7	1.5
10.0	9.3	1.5
12.0	9.0	1.6
14.0	8.6	1.7
16.0	7.6	1.8
16.7	Bottom	

Lake: **LE MORAY #1**

WINTER

DISSOLVED OXYGEN AND TEMPERATURE SERIES



Lake: **LE MORAY #1**

NETTING RECORD

Mesh sizes experimental order: 25, 76, 51, 89, 38, 64 mm

NETTING SITE #1

Type:	Sinking monofilament		
Date Set:	September 8, 1991	Time:	1900 hrs
Date Lifted:	September 9, 1991	Time:	1000 hrs
Net Dimensions:	Length: 91.4 m	Depth:	2.4 m
Shallow End Mesh Size:	25 mm	Depth:	2.3 m
		Substrate:	sand/glacial silt
Deep End Mesh Size:	64 mm	Depth:	12 m
		Substrate:	?, suspect glacial silt

Comments:

2 Gammarus observed on gill net.

NETTING SITE #2

Type:	Sinking monofilament		
Date Set:	September 8, 1991	Time:	1820 hrs
Date Lifted:	September 9, 1991	Time:	0915 hrs
Net Dimensions:	Length: 91.4 m	Depth:	2.4 m
Shallow End Mesh Size:	25 mm	Depth:	1.0 m
		Substrate:	glacial silt/sand /cobble
Deep End Mesh Size:	64 mm	Depth:	9.0 m
		Substrate:	organics

Lake: **LE MORAY #1**

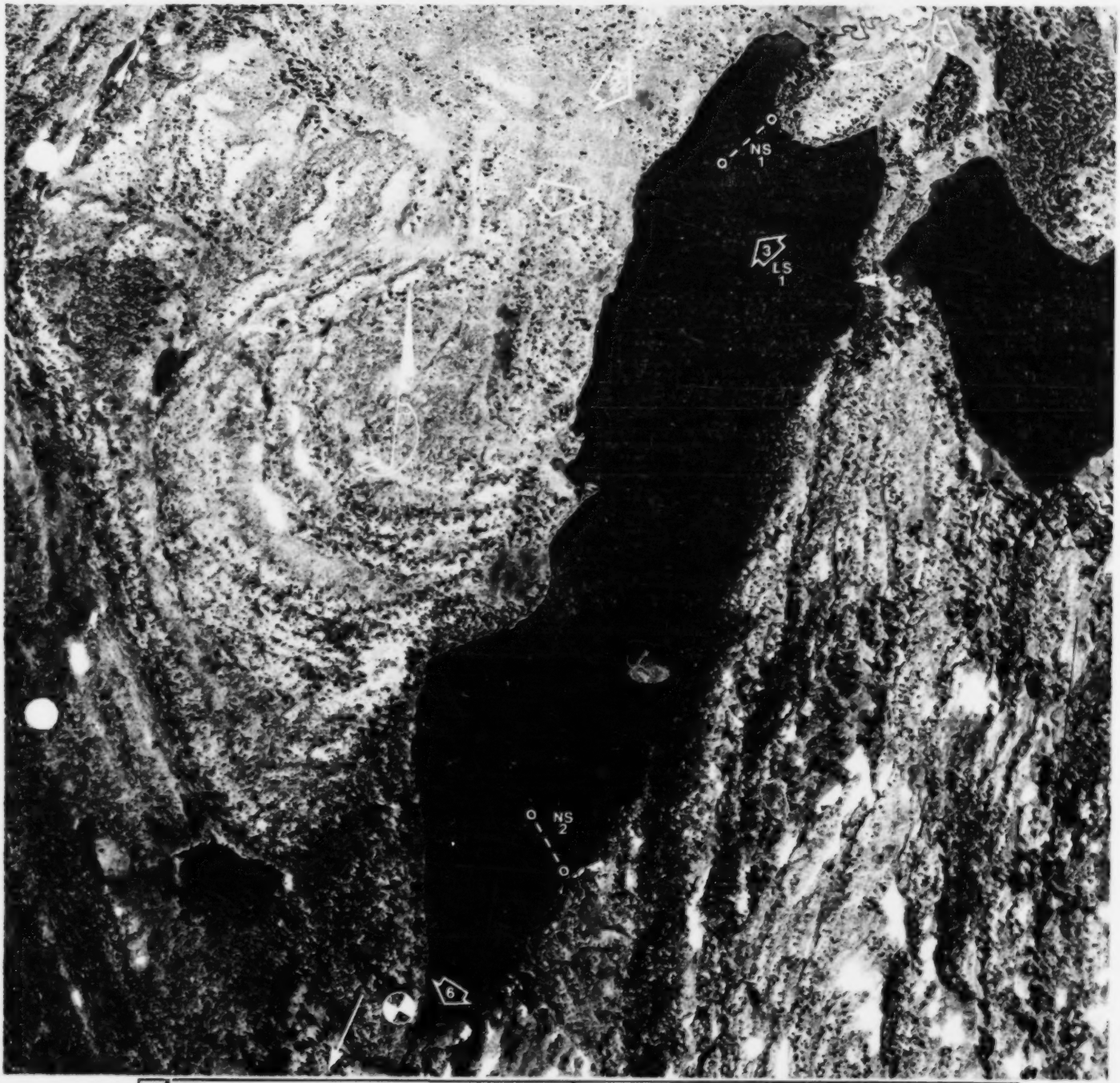
LAKE CATCH SUMMARY

No fish netted.

Minnow Traps:

BAIT: Sardines

#	HOURS	DEPTH (m)	SUBSTRATE	SPECIES	SIZE RANGE (cm)
1	13.90	0.4	sand/glacial silt	1 beetle	
2	13.00	0.35	sand/glacial silt	nil	



1	Plate number, area, and direction
2	Point sample, number, and location
	Bench mark
LS 1	Limno station location and number
0 - - - 0 NS 1	Netting site location and number
← 1	Stream flow direction and number

LOCATION OF INVENTORY SITES

Figure 1

Lake: Le Moray #1

Reference No.: B.C. 7188:59

Reference Date: June, 1969

Scale 1:5123

Lake: **LE MORAY #1**

PHOTOGRAPH DIRECTORY

Negative #	Plate #	Description
R106:8	1	Aerial view of Le Moray Lake #1 looking south. Le Moray Lake #2 is located to the left.
R106:9	2	Aerial view of Le Moray Lake #1 looking east. Note Le Moray Lake #2 in background. Arrow points to stream connecting the two lakes.
R106:18,19	3	Panoramic view looking northwest, taken from limno station.
R106:10	4	Upstream view of point sample site on inlet #1, taken approximately 220 m upstream from the lake.
R106:11	5	Downstream view of point sample site on inlet #1, taken approximately 220 m upstream from the lake.
R106:16	6	View downstream at outlet, taken from lake.
R106:14	7 *	Upstream view at point sample site on outlet, taken 200 m downstream of the lake.
R106:15	8 *	Downstream view at point sample site on outlet, taken 200 m downstream of the lake.
R106:23	9 *	Aerial view of falls on the outlet, taken approximately 700 m downstream of the lake. These falls are definate barriers to upstream fish migration.

* Not shown on air photo.

Lake: **LE MORAY #1**

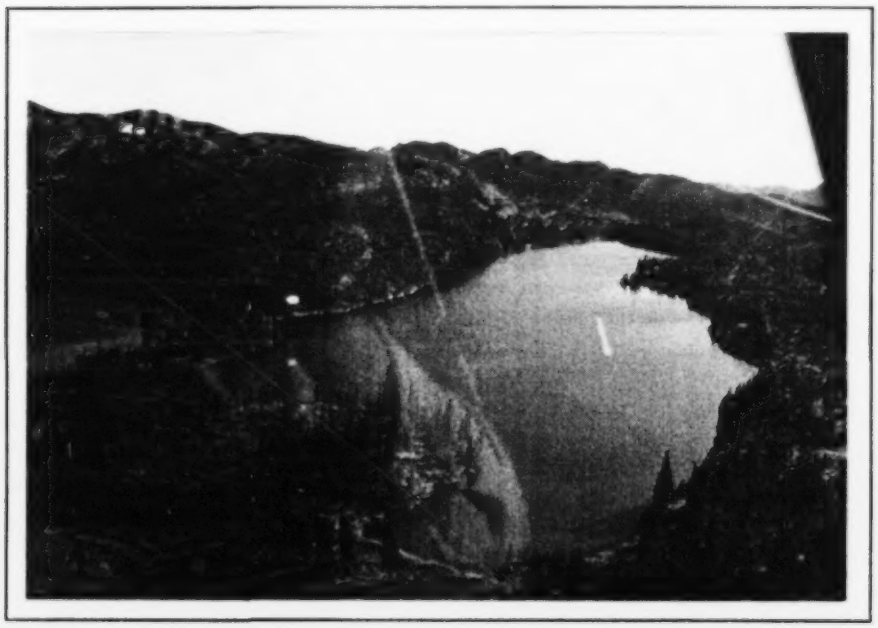


Plate 1: Aerial view of Le Moray Lake #1 looking south. Le Moray Lake #2 is located to the left.

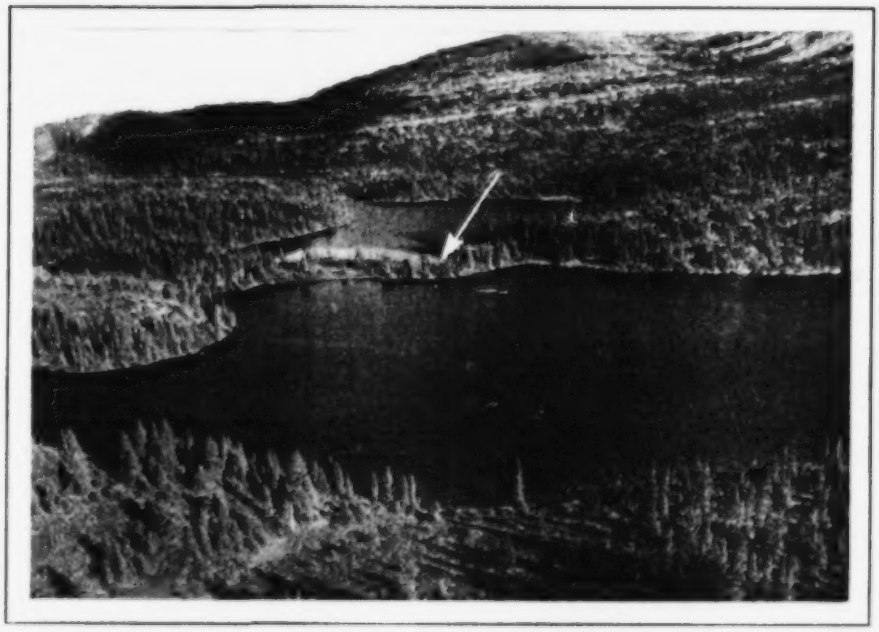


Plate 2: Aerial view of Le Moray Lake #1 looking east. Note Le Moray Lake #2 in background. Arrow points to stream connecting the two lakes.

Lake: **LE MORAY #1**

Plate 3: Panoramic view looking northwest, taken from limno station.

Lake: **LE MORAY #1**

Plate 4: Upstream view of point sample site on inlet #1, taken approximately 220 m upstream from the lake.

Plate 5:
Downstream view of point sample site on inlet #1, taken approximately 220 m upstream from the lake.

Lake: **LE MORAY #1**

Plate 6: View downstream at outlet, taken from lake.

Plate 7: Upstream view at point sample site on outlet, taken 200 m downstream of the lake.

Lake: **LE MORAY #1**

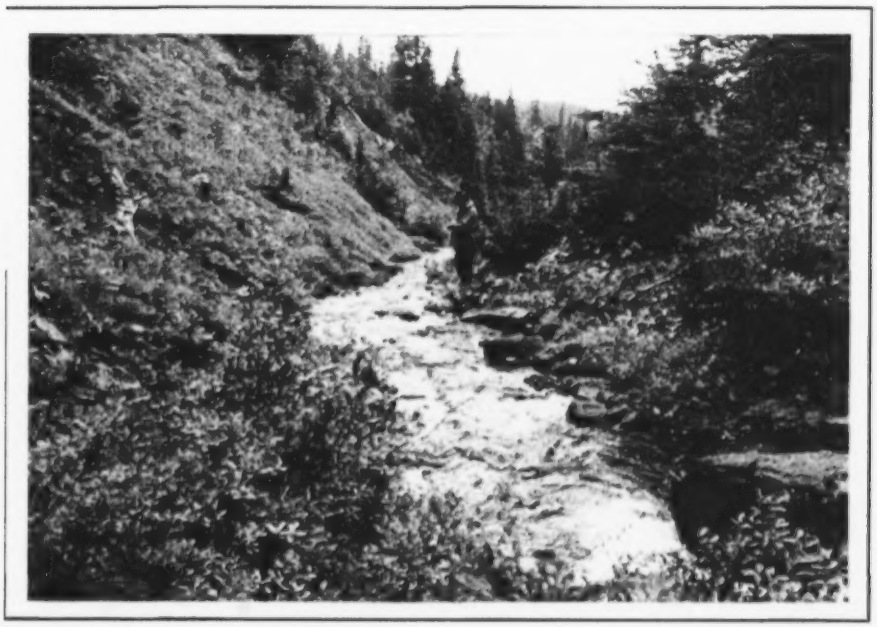


Plate 8: Downstream view at point sample site on outlet, taken 200 m downstream of the lake.

Plate 9: Aerial view of falls on the outlet, taken approximately 700 m downstream of the lake. These falls are definate barriers to upstream fish migration.

Lake: LE MORAY #1

Appendix A

LABORATORY REPORT

Water Chemistry Analysis

Site: NOSITE UNNAMED "LEMORAY" LAKE #1

Submitted by (23286) BLACKMAN B

Address (07) Waste Management Branch
Northern Region
3rd Floor, 1011 4th Avenue
Prince George, BC V2L 3H9

Phone No. 565-6943

Audit Sample ( )
Client study reference code ( )
Sampling agency code (91)

Site (NOSITE) UNNAMED "LEMORAY" LAKE #1

Sample Adjective ( )
Sample State (FW) Fresh Water
Sample Descriptor (GE) General

This form was processed to the computer on 16-SEP-1991 as REGULAR
The cost for analyzing samples for this form is

Routine analysis:	$	116.84
Special analysis:	$	0.00
Total	$	116.84

FISH - PRINCE GEORGE ATTN: ALLISTER McLEAN Sample 91017763

Site: NOSITE UNNAMED "LEMORAY" LAKE #1

From : 91/09/10: 0000 To : 91/09/10: 0000
Depth Range : 0.0 0.0 Tide :
Sample State: Fresh Water
Sample Comment:

Parameter Description	Result	Units	Analytical Technique (Specode/Medium/Pres'n)
pH	7.8	pH units	Automated pH Meter (00041220/02/01)
Residue Nonfilt.	1	mg/L	Grav. 9 cm Buchner, 103C (00061070/02/01)
Specific Conductance	73	uS/cm	Cond. Meter Siebold (00111150/02/01)
Res. Filterable 1.0u	56	mg/L	Gravimetric 1.0u Filter (007H1032/02/01)
Alkalinity Total 4.5	34.4	mg/L	Automated Electrometer (01021210/02/01)

B.C. LABORATORY SERVICES
Report for Form 10004013

FISH - PRINCE GEORGE ATTN: ALLISTER McLEAN Sample 91017764

Site: NOSITE UNNAMED "LEMORAY" LAKE 01

From :91/09/10:0000 To :91/09/10:0000
Depth Range : 19.0 19.0 Tide :
Sample State: Fresh Water
Sample Comment:

Parameter Description	Result	Units	Analytical Technique (Sparcode/Medium/Pres'n)
pH	7.4	pH units	Automated pH Meter (00041220/02/01)
Residue Nonfilt.	1	mg/L	Grav: 9 cm Buchner, 105C (00081070/02/01)
Specific Conductance	77	uS/cm	Cond Meter Siebold (00111160/02/01)
Res. Filterable 1.0u	58	mg/L	Gravimetric 1.0u Filter (007H1032/02/01)
Alkalinity Total 4.5	36.2	mg/L	Automated Electromotor (01021210/02/01)

Lake: LE MORAY #1

Appendix B

TRIBUTARY STREAM DATA

Lake: **LE MORAY #1**

System Name: **Unnamed C.** **inlet #1**

System No.:

Site Location: Sample Site #1, 220 m upstream of the lake on inlet #1

Date:	Sept. 9, 1991	Time:	1340 hrs
Channel Width:	1.5 m	Water Temp.:	4.5 °C
Wetted Width:	1.5 m	Stage (flow)	low
Max. Depth:	20 cm	Velocity:	4.25 m/sec
Avg. Depth:	15 cm	Field Gradient:	1.5 %
Turbidity:	20 cm	Colour:	gin clear
Flood Signs:			
Height:	2.0 cm		
Type:	N/A		

Substrate Breakdown:

Fines	Small Gravel	Large Gravel	Cobble
5 %	5 %	15 %	15 %
Boulder	**Bedrock**		
60 %	- %		

Substrate Compaction: moderate Sand: 30 %

Banks:

	Form	Height	Stability
Right	undercut	0.2 m	stable due to rooted vegetation and moss
Left	undercut	0.2 m	stable due to rooted vegetation and moss

Comments:

Field gradient measured over 11.0 m.
Velocity measured over 4.0 m.
Small amounts of usable spawning habitat present.
Fair juvenile rearing habitat.
No overwintering habitat.
Low water temperature.

Lake: **LE MORAY #1**

System Name: **Unnamed C.** **outlet**

System No.: **234-8120-254**

Site Location: Sample site # 1, 220 m downstream of the lake on the outlet.

Date:	Sept. 9, 1991	Time:	1430 hrs
Channel Width:	2.7 m	Water Temp.:	10 °C
Wetted Width:	2.7 m	Stage (flow)	low
Max. Depth:	20 cm	Velocity:	1 m/sec
Avg. Depth:	15 cm	Field Gradient:	5 %
Turbidity:	20 cm	Colour:	gin clear

Flood Signs:

Height:

Type:

Substrate Breakdown:

Fines	Small Gravel	Large Gravel	Cobble
-- %	-- %	10 %	10 %
Boulder	**Bedrock**		
30 %	50 %		

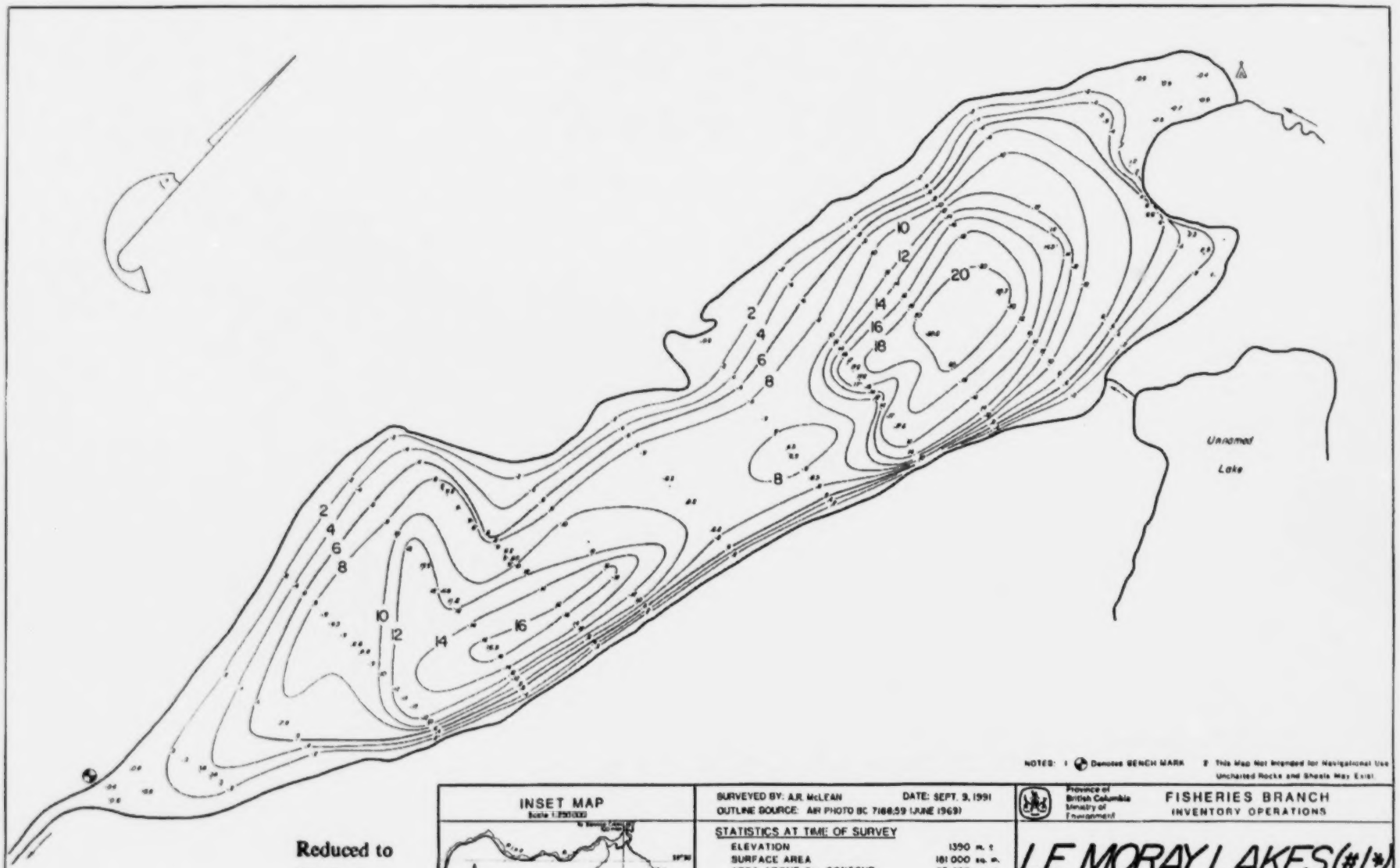
Substrate Compaction: high Sand: 0 %

Banks:

	Form	Height	Stability
Right	repose	35 m	moderate
Left	repose	35 m	moderate

Comments:

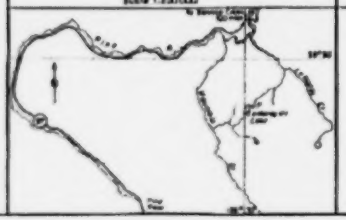
Field gradient and velocity measured over 10.0 m.
Minimal spawning and rearing habitat present.
No overwintering habitat.
Outlet flows through a valley.



NOTES: 1 ⊕ Denotes BENCH MARK 2 This Map Not Intended for Navigational Use
Uncharted Rocks and Shoals May Exist.

Reduced to
50%
of Original

INSET MAP
Scale 1:250000



SURVEYED BY: A.R. McLEAN DATE: SEPT. 9, 1991
OUTLINE SOURCE: AIR PHOTO BC 7180:59 (JUNE 1969)

STATISTICS AT TIME OF SURVEY

ELEVATION	1390 m. ±
SURFACE AREA	181 000 sq. m.
AREA ABOVE 6m CONTOUR	65 400 sq. m.
VOLUME	1 461 000 cu. m.
MEAN DEPTH	8.1 m.
MAX. DEPTH	20.8 m.
PERIMETER, MAIN SHORE	2550 m.
PERIMETER, ISLANDS	m.
BENCH MARK HEIGHT ABOVE WATER LEVEL	2.0 m.

Province of British Columbia Ministry of Environment
FISHERIES BRANCH
INVENTORY OPERATIONS

LE MORAY LAKES (#1*)

DEPTHS IN METERS

WATERSHED CODE: 234-6610-254	U.T.M. CO-ORDINATE: 10 533547 6145940	
MAP: 92-P/7	FAIR DWG: B.A.D./R.S.D.	REV. DATE:
PLOTTING: R.S.D.	FAIR DWG. CHECK: J.A.B.	SCALE: 1:2 000
CONTOURS: J.A.B.	DRAFT DATE: FEB 13, 1992	
CALCULATIONS: D.M.C.	APPROVED:	N.T.S. NO: 930/7.8
TECH. CHECK: J.A.B.		